Infant preparations for language

- What do babies know about language?
  - any language
  - their native language
- What do they have to learn?

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Perceptual preparations for language

Lookjoeyfoundafrog! ⟷ 

2 perceptual questions:

Do infants perceive …

… the right kinds of objects & events

… the sounds of speech as we do?

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Outline

1. Speech to infants
   - And how infants respond to it
2. Speech sound categorization
   - For adults
   - Initial infant capacities
   - How infants' capacities change
3. Finding words

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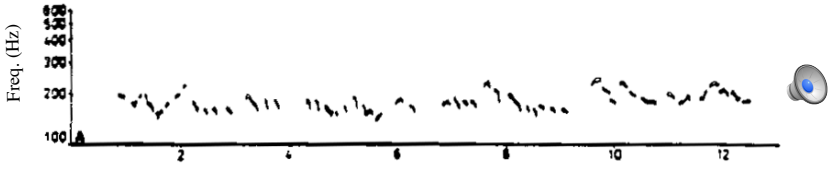
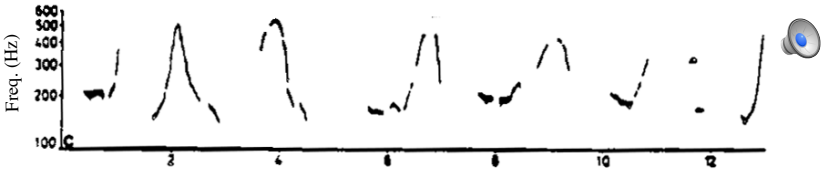
1. Compare Adult-directed Speech ...



To Infant-directed Speech ...



From Fernald et al. 1984

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Infant-directed speech (or "motherese")

- has
  - higher pitch
  - bigger pitch range
  - smoothed and connected pitch contours
- This is widely found across languages and cultures.

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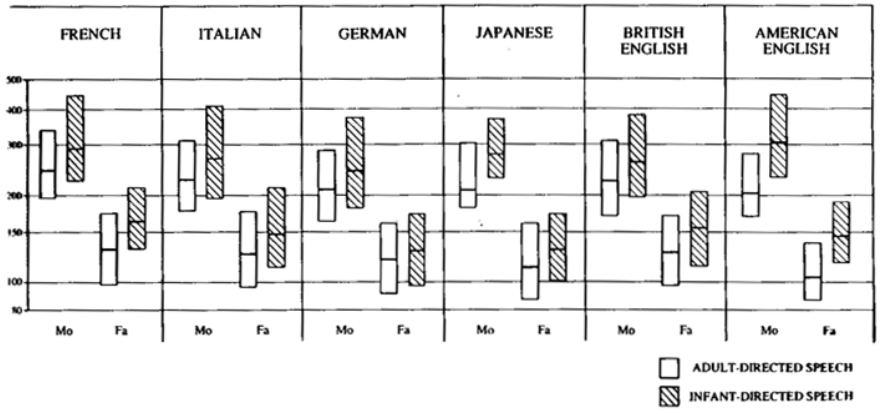
Mothers & Fathers, Across Cultures



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Babies prefer motherese (Fernald):

- 4-month-olds
- Listened to 4 strangers' speech
  - To their own infants
  - Or to an adult

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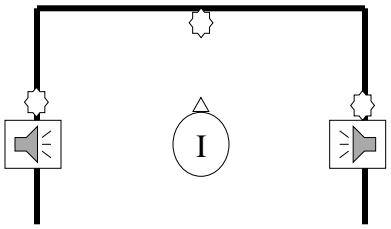
How can we tell what they prefer? Listening Preference Task



1. Center light
2. Side light
3. Sound starts when I turns to side
4. And stops when I looks away

So … I chooses how long to listen!

I's listen longer to ID than AD speech (from strangers)

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How could this help acquisition?

- ID speech engages and holds the infant's interest (e.g., Fernald, Werker & McLeod)
- ID speech is higher pitched
  - Subjective loudness increases with pitch
  - So higher-pitched tones are easier to hear
- ID speech is emotional speech – it conveys emotional messages (Fernald)

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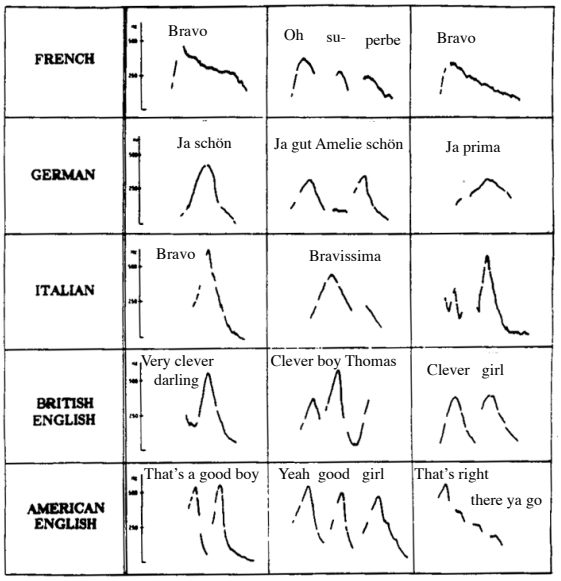
Approval



From Fernald et al. 1989

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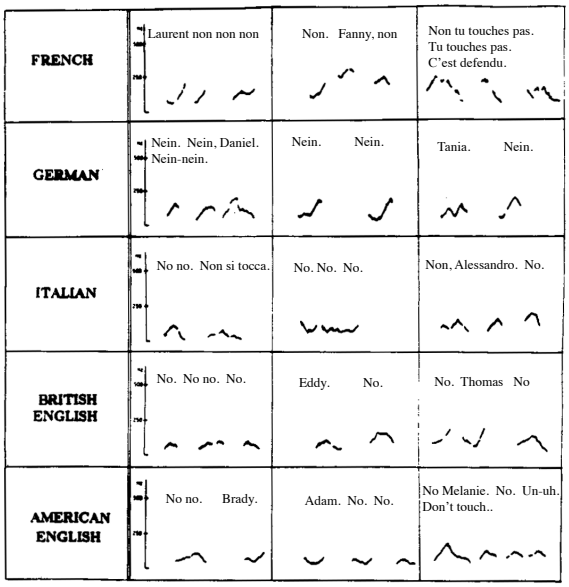
Prohibition



From Fernald et al. 1989

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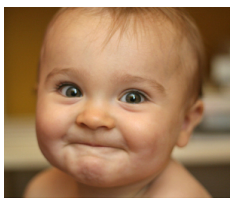
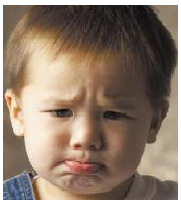
Fernald (1993): Do infants get the message?

- How to assess whether they "get the message"?
- 5-month-olds

Measure: Facial expression (smiling, frowning) while listening to Approval or Prohibition contours





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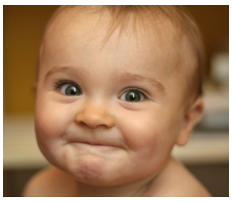
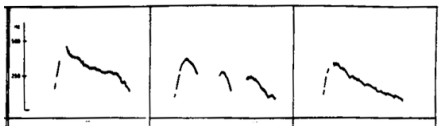
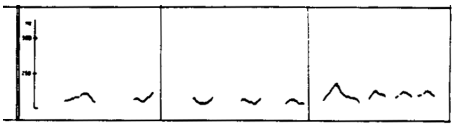
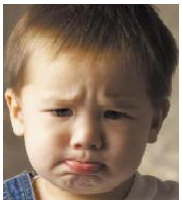
Results



More positive affect to approval contours.







More negative affect to prohibition contours.

So: Babies are influenced by emotional tone of ID speech, even in unfamiliar languages.

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... and ID speech is *clearer* in some ways

- Because ID speech is slower, higher-pitched and has more pitch change:
  - different vowels (e.g., 'a' vs. 'i') are easier to tell apart

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Outline

1. Speech to infants
   And how infants respond to it
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   For adults
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2. What about the sounds of speech? l versus r, b versus p?

- Adults first!
  - Speech sounds come in CATEGORIES
    - defined by how produced
    - e.g., place & voicing

	place	voicing
b	bilabial	+
p	bilabial	-

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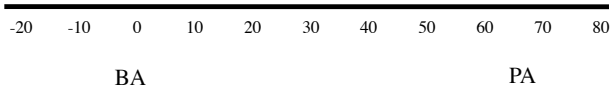
1. Starting point for speech perception

- Adults first.
- Speech sounds vary continuously,



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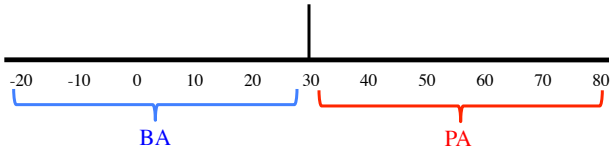
1. Starting point for speech perception

- Speech sounds vary continuously, but we perceive them (consciously) in strict categories:



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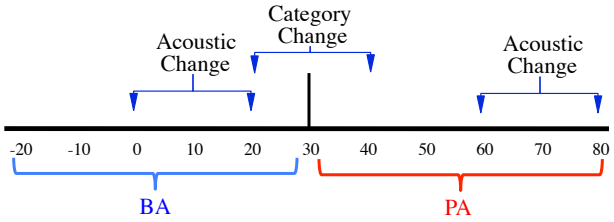

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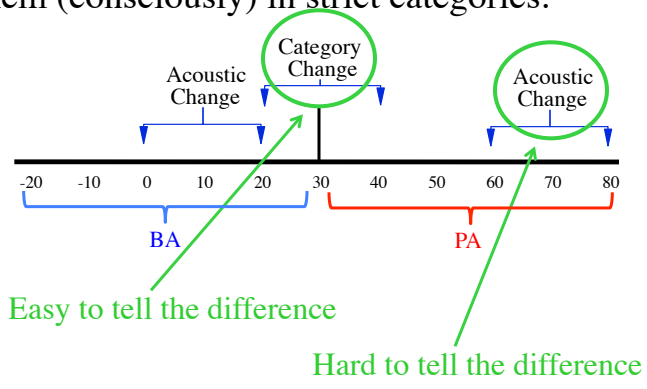

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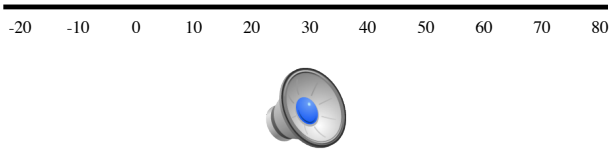
Class demo on categorical perception



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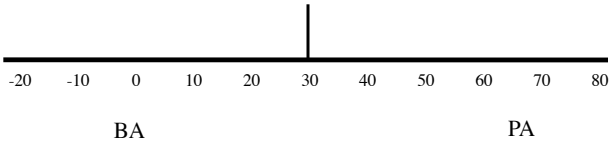
Back to infants:

- Do they perceive speech categorically?
- Or do they have to build those category boundaries from scratch?



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First, how can we tell if infants perceive the same category boundaries?

Habituation task:

- 1 sound plays repeatedly when baby sucks on pacifier
- After a few minutes, baby gets bored and response rate decreases
- Present new sound and see if baby responds again.

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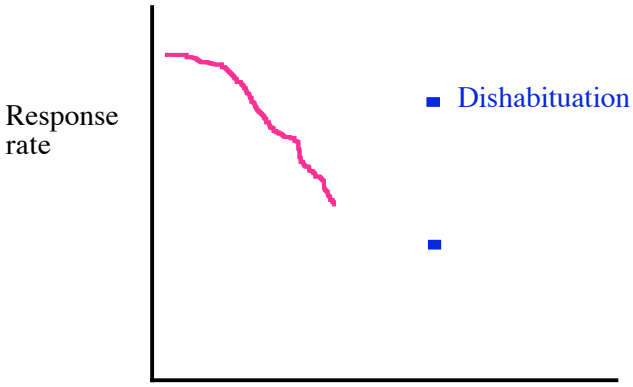
Remember habituation?



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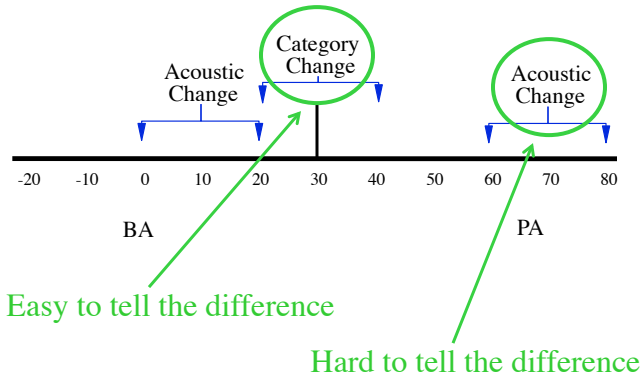
Starting point for speech perception

- Infants too: (even newborns)



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Question:

- Does categorical perception of speech-sound categories in newborns tells us that those categories are built in (i.e. innate)?

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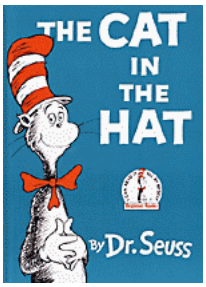
Even newborns have had some opportunity to hear their native language!

- Pregnant women read a story out loud in last 6 weeks of pregnancy
- Tested as newborns, with the same story versus a different story



Preferred the same story!

- Control group whose mothers did not read this story showed no preference.

DeCasper & Spence

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But strong evidence on innateness comes from infants' perceptions of *non-native speech sounds*

- Speech sound categories are not the same across languages
- e.g., English r vs. l are not different consonants in Japanese

Japanese L/R	
English R	English L

✓ Young Japanese infants easily discriminate R from L.
✗ Japanese-speaking adults don't.

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This change happens
FAST (Werker)

- 6 to 8 months: Infants do discriminate non-native sounds
- 10 to 12 months: Infants no longer discriminate non-native sounds.

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- Infants start with a built-in set of speech categories
  - enough to learn any language
- Then learn to ignore sound contrasts that aren't used in their language.

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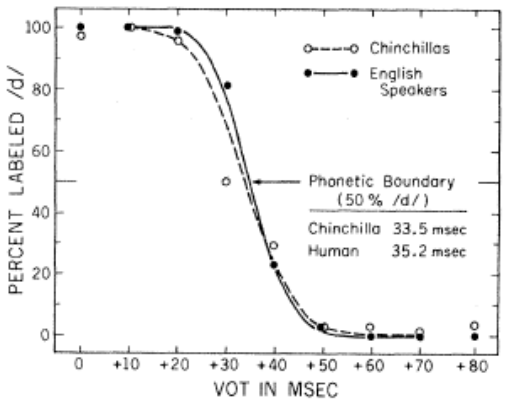
Other animals discriminate speech sounds in similar ways: not a uniquely human capacity!



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When do babies recognize words?

- Infants under a year old identify words (as familiar sound patterns)

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The earliest example of word recognition:

- Baby's own name

Mandel, Jusczyk, & Pisoni

4.5-month-olds, listening preference task

Repetitions of own name:

"Katie! Katie. ... "

OR Same-stress control:

"Kevin! Kevin ... "

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Results:

- Infants listened longer to own name
- Even 4.5-month-olds accurately represent and remember the sounds patterns of words (at least, some words)

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Can infants find words in connected speech?

This is a hard problem:

– There aren't normally pauses between words

How do you figure out which pieces of ordinary sentences <u>are</u> words?

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Infants CAN find words in connected speech

- Infants keep track of which speech sounds occur predictably in the same order
- Syllables *within a word* follow each other predictably
  - but at the boundary between one word and the next, anything could happen

...prettybaby...

...prettyflower...	...goodbaby...
...prettydress...	...nicebaby...
...prettyflower...	...yourbaby...

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Saffran, Aslin, Newport

- 8-month-old infants
- **Familiarization:** Listen for 2 minutes to
  4 3-syllable "words" (tokibu, gopila, gikoba...)
  randomly ordered, NO PAUSES
  …gikobatokibugopilatokibu….
- **The statistics define the words**:
  - 'to' always followed by 'kibu'
  - 'ba' followed by 'toki' only occasionally

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Saffran, Aslin, Newport

- **Listening preference test**:

  Word trials: "words" from the familiarization stream in isolation

  e.g., Tokibu! Tokibu.

  Non-word trials: sequences that did not occur consistently in the same order

  e.g., Batoki! Batoki.

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Saffran, Aslin, Newport

Result:

8-month-olds listened longer to non-word than word trials [*novelty preference -- they got bored with those 4 words*]

Interpretation:

– Infants kept track of which sounds occurred predictably in a row

– Repeated, predictable sequences begin to sound like they belong together – they become words

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Summary

- Speech to infants has special properties
  - Infants prefer infant-directed style speech
  - And find its 'melody' meaningful
  - ID speech is clear speech
- Infants perceive speech categorically
  - They begin with a universal set of contrasts
    - Therefore discriminate sounds their parents cannot!
  - And learn to restrict their attention to language-specific contrasts
- Infants learn to recognize words as sound patterns – even if they never hear those words surrounded by pauses

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